

THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Previously presented) A processing apparatus comprising:

a gas supply mechanism that supplies a processing gas into a processing chamber via a plurality of gas supply holes including a plurality of primary gas supply holes and a plurality of circulating gas supply holes,

an evacuating mechanism that evacuates the processing gas from said processing chamber, and

a gas circulating mechanism that returns at least a portion of exhaust gas evacuated from said processing chamber to said gas supply mechanism,

wherein said gas supply mechanism includes,

a primary gas supply system that supplies primary gas supplied from a processing gas source into said processing chamber via said primary gas supply holes, and

a circulating gas supply system that supplies at least a portion of the exhaust gas into said processing chamber via said circulating gas supply holes with said primary gas supply system and said circulating gas supply system constituted as systems independent of each other, and

wherein the ratio of the number of said primary gas supply holes and the number of said circulating gas supply holes equals the target ratio of a primary gas flow rate and a circulating gas flow rate, the flow rate of the circulating gas being higher than the flow

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rate of the primary gas, so that the number of said circulating gas supply holes is greater than the number of said primary gas supply holes, and

wherein the hole radius and the hole density of said primary gas supply holes are constant over an entire surface and the hole radius and the hole density of said circulating gas supply holes are constant over the entire surface.

2. Canceled.

3. (Previously presented) A processing apparatus according to claim 1, wherein the hole radius of said gas supply holes is constant over the entire surface,

wherein the ratio of the area over which said primary gas supply holes are provided and the area over which said circulating gas supply holes are provided is set equal to the ratio of a target flow rate for said primary gas and a target flow rate for said circulating gas, and

wherein the hole density of said circulating gas supply holes is set so as to ensure that the back-pressure is equal to or lower than the rated back-pressure of said evacuating mechanism when said circulating gas is supplied at the target flow rate.

4. (Previously presented) A processing apparatus according to claim 1, wherein the hole density of said gas supply holes is constant over the entire surface,

wherein the ratio of the area over which said primary gas supply holes are provided and the area over which said circulating gas supply holes are provided is set

equal to the ratio of a target flow rate for said primary gas and a target flow rate for said circulating gas, and

wherein the hole radius of said circulating gas supply holes is set so as to ensure that the back-pressure is equal to or lower than the rated back-pressure of said evacuating mechanism when said circulating gas is supplied at the target flow rate.

5. (Previously presented) A processing apparatus according to claim 1, wherein the ratio of the number of said primary gas supply holes per unit area and the number of said circulating gas supply holes per unit area at said gas supply mechanism is constant over the entire surface of said gas supply mechanism.

6. (Previously presented) A processing apparatus according to claim 1, wherein the conductance of said circulating gas supply system is set higher than the conductance at said gas supply mechanism.

7. Canceled.

8. (Previously presented) A processing apparatus according to claim 1, wherein a buffer space is provided at least at one of said gas circulating mechanism and said circulating gas supply system.

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9. (Previously presented) Processing apparatus according to claim 1, wherein a means for filtering said circulating gas is provided at least at one of said gas circulating mechanism and said circulating gas supply system.

10. (Previously presented) A processing apparatus according to claim 1, wherein the gas supply mechanism is configured to provide the primary gas at the outlet of said primary gas supply holes into said processing chamber at a velocity equal to or higher than 500 m / sec.

11. (Previously presented) A processing apparatus according to claim 1, wherein the gas circulating mechanism is configured to provide said circulating gas at the outlet of said circulating gas supply holes into said processing chamber at a velocity equal to or higher than 500 m / sec.

14. (Currently amended) A processing apparatus comprising:
a gas supply mechanism that supplies a processing gas into a processing chamber via a plurality of gas supply holes including a plurality of primary gas supply holes and a plurality of circulating gas supply holes;
an evacuating mechanism that evacuates the processing gas from said processing chamber; and

a gas circulating mechanism that returns at least a portion of exhaust gas evacuated from said processing chamber to said gas supply mechanism,

wherein said gas supply mechanism includes,

a primary gas supply system that supplies primary gas supplied from a processing gas source into said processing chamber via said primary gas supply holes, and

a circulating gas supply system that supplies at least a portion of the exhaust gas into said processing chamber via said circulating gas supply holes with said primary gas supply system and said circulating gas supply system constituted as systems independent of each other, and

wherein the ratio of the number of said primary gas supply holes and the number of said circulating gas supply holes equals the target ratio of a primary gas flow rate and a circulating gas flow rate, the flow rate for the circulating gas being higher than the flow rate for the primary gas, so that the number of said circulating gas supply holes is greater than the number of said primary gas supply holes,

and wherein primary gas supply holes formed in a specific area are surrounded by circulating gas supply holes formed in a number larger than the number of said primary gas supply holes in said specific area ~~the circulating gas holes are spaced differently than the primary gas supply holes, and surround the primary gas holes.~~

15. (Previously presented) A processing apparatus comprising:

a gas supply mechanism that supplies a processing gas into a processing chamber through primary gas supply holes;

an evacuating mechanism that evacuates the processing gas from said processing chamber, and

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a gas circulating mechanism that returns at least a portion of exhaust gas evacuated from said processing chamber to said processing chamber through circulating gas supply holes,

wherein said gas supply mechanism includes,

a primary gas supply system that supplies primary gas supplied from a processing gas source into said processing chamber, and

a circulating gas supply system that supplies at least a portion of the exhaust gas into said processing chamber with said primary gas supply system and said circulating gas supply system constituted as systems independent of each other, and

wherein the ratio of the total area of said primary gas supply holes and the total area of said circulating gas supply holes equals the target ratio of a primary gas flow rate and a circulating gas flow rate, the flow rate for the circulating gas being higher than the flow rate for the primary gas, so that the total area of said circulating gas supply holes is greater than the total area of said primary gas supply holes.

16. (Previously presented) A processing apparatus according to claim 14, wherein the hole radius and the hole density of said gas supply holes are constant over the entire surface.

17. (Previously presented) A processing apparatus according to claim 14, wherein the hole radius of said gas supply holes is constant over the entire surface,

wherein the ratio of the area over which said primary gas supply holes are provided and the area over which said circulating gas supply holes are provided is set

equal to the ratio of a target flow rate for said primary gas and a target flow rate for said circulating gas, and

wherein the hole density of said circulating gas supply holes is set so as to ensure that the back-pressure is equal to or lower than the rated back-pressure of said evacuating mechanism when said circulating gas is supplied at the target flow rate.

18. (Previously presented) A processing apparatus according to claim 14, wherein the hole density of said gas supply holes is constant over the entire surface,

wherein the ratio of the area over which said primary gas supply holes are provided and the area over which said circulating gas supply holes are provided is set equal to the ratio of a target flow rate for said primary gas and a target flow rate for said circulating gas, and

wherein the hole radius of said circulating gas supply holes is set so as to ensure that the back-pressure is equal to or lower than the rated back-pressure of said evacuating mechanism when said circulating gas is supplied at the target flow rate.

19. (Previously presented) A processing apparatus according to claim 14, wherein the conductance of said circulating gas supply system is set higher than the conductance at said gas supply mechanism.

20. (Previously presented) A processing apparatus according to claim 14, wherein a buffer space is provided at least at one of said gas circulating mechanism and said circulating gas supply system.

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21. (Previously presented) A processing apparatus according to claim 14, wherein a means for filtering said circulating gas is provided at least at one of said gas circulating mechanism and said circulating gas supply system.

22. (Previously presented) A processing apparatus according to claim 14, wherein the gas supply mechanism is configured to provide the primary gas at the outlet of said primary gas supply holes into said processing chamber at a velocity equal to or higher than 500 m / sec.

23. (Previously presented) A processing apparatus according to claim 14, wherein the gas circulating mechanism is configured to provide said circulating gas at the outlet of said circulating gas supply holes into said processing chamber at a velocity equal to or higher than 500 m / sec.

24. Canceled.

25. (New) A processing apparatus comprising:

a gas supply mechanism that supplies a processing gas into a processing chamber via a plurality of gas supply holes formed at a shower head and including a plurality of primary gas supply holes and a plurality of circulating gas supply holes, an evacuating mechanism that evacuates the processing gas from said processing chamber, and

a gas circulating mechanism that returns at least a portion of exhaust gas evacuated from said processing chamber to said gas supply mechanism,

wherein said gas supply mechanism includes,

a primary gas supply system that supplies primary gas supplied from a processing gas source into said processing chamber via said primary gas supply holes, and

a circulating gas supply system that supplies at least a portion of the exhaust gas into said processing chamber via said circulating gas supply holes with said primary gas supply system and said circulating gas supply system constituted as systems independent of each other at said shower head,

wherein the ratio of the number of said primary gas supply holes and the number of said circulating gas supply holes equals the target ratio of a primary gas flow rate and a circulating gas flow rate, the flow rate of the circulating gas being higher than the flow rate of the primary gas, so that the number of said circulating gas supply holes is greater than the number of said primary gas supply holes, and

wherein the hole radius and the hole density of said primary gas supply holes are constant over an entire surface, and

said primary gas supply system and said circulating gas supply system are connected with each other via piping having a means for flow rate adjustment mounted thereon.

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26. (New) A processing apparatus comprising:

a gas supply mechanism that supplies a processing gas into a processing chamber via a plurality of gas supply holes including a plurality of primary gas supply holes and a plurality of circulating gas supply holes,

an evacuating mechanism that evacuates the processing gas from said processing chamber, and

a gas circulating mechanism that returns at least a portion of exhaust gas evacuated from said processing chamber to said gas supply mechanism,

wherein said gas supply mechanism includes,

a primary gas supply system that supplies primary gas supplied from a processing gas source into said processing chamber via said primary gas supply holes, and

a circulating gas supply system that supplies at least a portion of the exhaust gas into said processing chamber via said circulating gas supply holes with said primary gas supply system and said circulating gas supply system constituted as systems independent of each other, and

wherein the ratio of the number of said primary gas supply holes and the number of said circulating gas supply holes equals the target ratio of a primary gas flow rate and a circulating gas flow rate, the flow rate of the circulating gas being higher than the flow rate of the primary gas, so that the number of said circulating gas supply holes is greater than the number of said primary gas supply holes,

wherein the circulating gas flow rate is set to circulate approximately 80% of the exhaust gas evacuated from said processing chamber, and

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wherein the hole radius and the hole density of said primary gas supply holes are constant over an entire surface and the hole radius and the hole density of said circulating gas supply holes are constant over the entire surface.

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